

## New flightless Eumolpinae of the genera *Apterodina* Bechyné and *Brachypterodina* n. gen. (Coleoptera: Chrysomelidae) from the Neotropics

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### Abstract

The genus *Apterodina* Bechyné is redescribed and two new species with reduced wings, *Apterodina bechynei* **n.sp.** and *Apterodina ruminyahui* **n.sp.** are described from South America, and *A. bucki* Bechyné is redescribed. *Brachypterodina* **new genus** is described from Costa Rica along with the new species *Brachypterodina morae* and *Brachypterodina gonzalezi*. Keys to species of both genera are provided. The genera *Apterodina* and *Brachypterodina* are similar in appearance and may represent at least two independent cases of hind wing reduction in response to high altitude.

### Resumen

Se describen las especies nuevas *Apterodina bechynei* **n.sp.** y *Apterodina ruminyahui* **n.sp.** de América del Sur, y se presenta una descripción nueva para el género *Apterodina*. También se

describen un género nuevo *Brachypterodina*, y dos especies nuevas, *Brachypterodina gonzalezi* y *Brachypterodina morae*, de Costa Rica. Se presentan claves a las especies de *Apterodina* y *Brachypterodina*.

**Key words:** *Apterodina bechynei*, *Apterodina bucki*, *Apterodina granulifera*, *Apterodina ruminyahui*, *Brachypterodina morae*, *Brachypterodina gonzalezi*, brachyptery, Chrysomelidae, Eumolpinae, Brazil, Costa Rica, Colombia, Ecuador

## Introduction

Wing reduction is well known in the leaf beetle subfamilies Chrysomelinae (Jolivet 1997) and Galerucinae (Konstantinov 2002, Furth 1980), and a few cases of apterous or brachypterous Eumolpinae have been reported. The best known case is *Dictyneis* Baly, a small genus of weevil-like eumolpines from Chile (Jerez 1996). Bechyné (1954) described the genus *Apterodina* from Brazil, giving its wingless condition with the usual associated rounding of the humeri as the diagnostic characters for the genus. That both Bechyné and Jerez described the wingless condition of their respective genera as unique for the Eumolpinae is a commentary on the fragmented state of South American chrysomelid literature. This paper reports two additional species of *Apterodina* from Ecuador and Colombia, and a new genus of Eumolpinae with reduced wings from Costa Rica. In the descriptions given below, terminology of the genitalia follows Flowers (1995, 1999) and Askevold and Flowers (1994).

Abbreviations for collections in which specimens are deposited are: INBio, National Biodiversity Institute of Costa Rica, Santo Domingo, Costa Rica; NHMB, Naturhistorisches Museum, Basel, Switzerland; NMNH, National Museum of Natural History, Washington, D.C.; MZUCR, Museo de Zoología, University of Costa Rica, San José, Costa Rica; HUM, Instituto Humboldt, Santa Fe de Bogota, Colombia.

## *Apterodina* Bechyné

(Fig. 3–6, 9, 11–16, 21–24, 29, 31–33.)

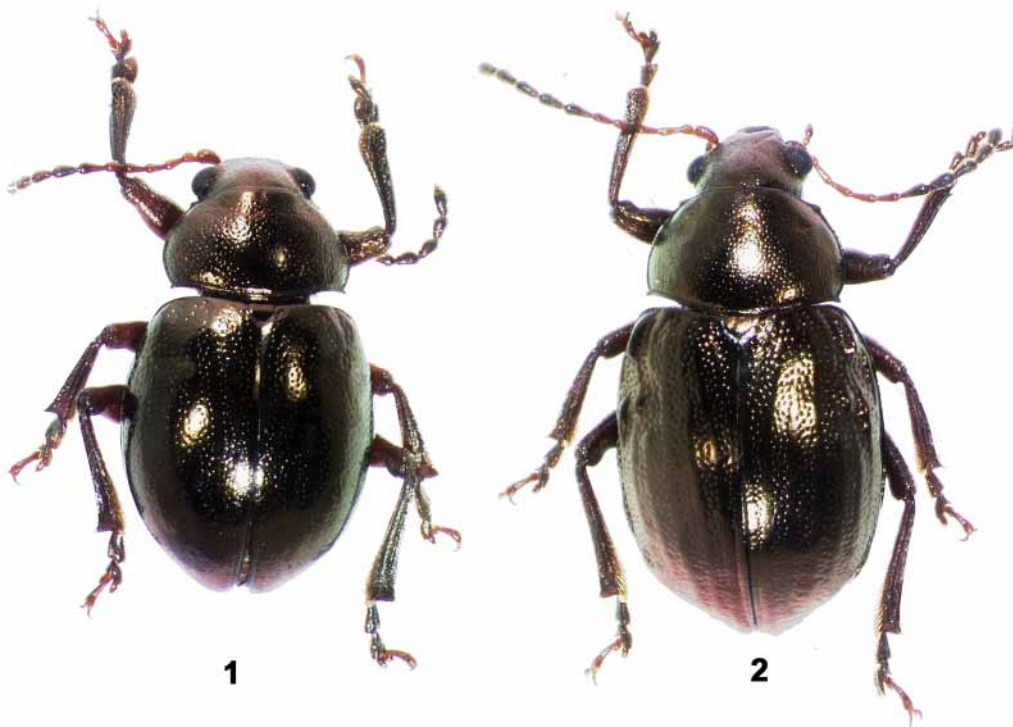
**Type species.** *Apterodina bucki* Bechyné 1954:117 (by original designation)

Body oval, dorsally convex. Head with clypeus coarsely punctate, punctures separated by distance greater than the diameter of a puncture, surface between punctures smooth, apex of clypeus emarginate. Frons coarsely punctate, punctures separated by distance greater than the diameter of a puncture; surface between punctures smooth; antennal calli smooth, slightly swollen. Eye oval, shallowly and broadly emarginate at antennal insertion; ocular sulcus running close to upper margin of eye. Antenna with scape and pedicel elongate oval, pedicel shorter than scape, distinctly shorter than flagellomere 1; flagellum filiform, each antennomere slightly wider at apex, elongate, antennomeres 7–11

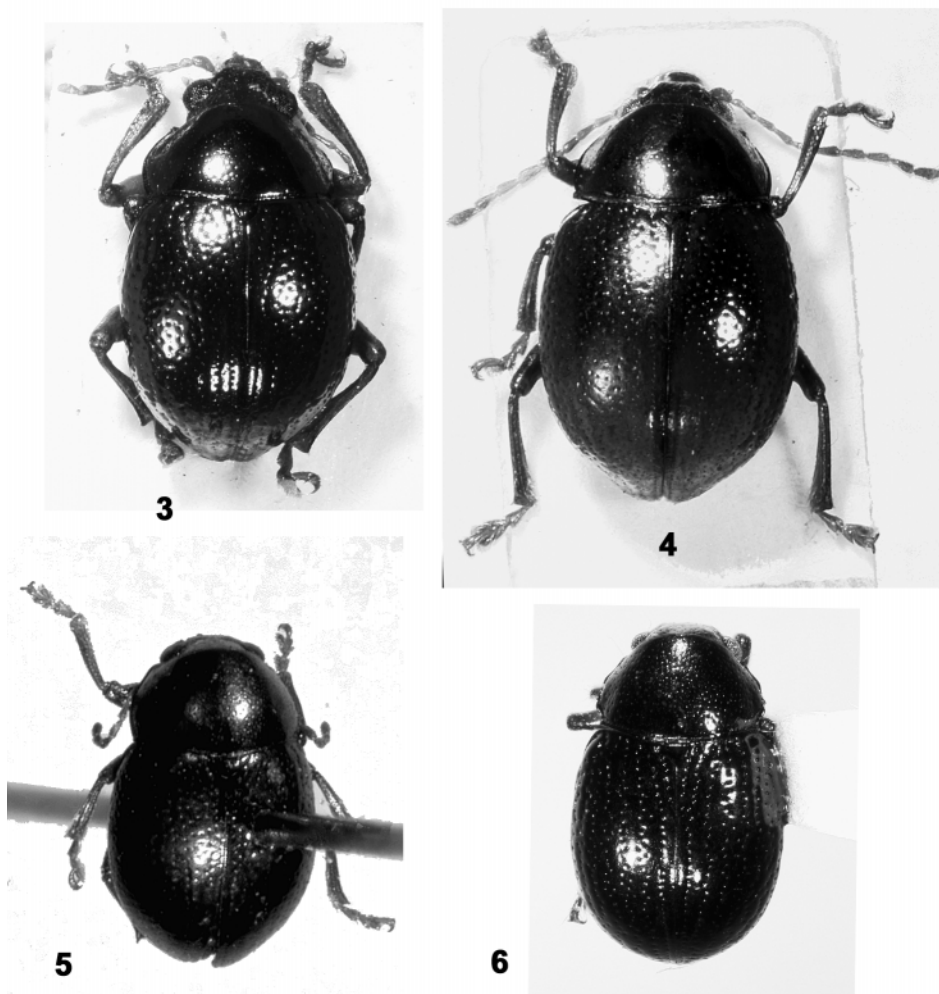
slightly enlarged; antennomeres 36 with scattered appressed setae, antennomeres 7–11 densely pubescent, with whorl of long erect setae at apex of antennomeres 3–10; antennomere 11 spindle-shaped. Mouthparts with apex of labrum emarginate, with 2 dorsal setae and short row of lateral setae along outer margin. Mandibles with outer margin with sharp bend, lateral surface smooth, a prominent seta on dorsal surface at angle, apical teeth broad, pointed. Maxillary palpi with apical segment tapered. Prothorax distinctly wider than long, pronotum strongly convex, with posterior margin wider than anterior margin; anterior angles variable, posterior angles obtuse; all angles with a seta-bearing puncture; basal marginal bead present; lateral margins narrow, rounded or weakly undulate, strongly converging in apical half, with widest part of pronotum near middle; disc regularly punctate; surface between punctures smooth, shining. Prosternum with long setae, finely punctate, anterior margin with a thick, perpendicular edge; intercoxal process expanded laterally behind coxae, its posterior margin weakly emarginate, lateral angles of intercoxal process thickened. Lateral arms of prosternum with anterior margins straight, surface glabrous, bearing a raised costa from inner side of coxal cavity to exterior angle. Proepimeron weakly concave, sparsely punctate, with punctures separated by distance greater than diameter of a puncture, with surface smooth, shiny. Mesosternum subequal in width to prosternum, flat between coxae, surface coarsely punctate, with scattered setae. Metasternum very short, narrow between meso- and metacoxae, transversely wrinkled; metepisternum gradually narrowed posteriorly, with surface alutaceous. Legs sparsely covered with short prostrate setae; all surfaces alutaceous. Femora strongly swollen in middle. Tibiae multicarinate, slightly to moderately sulcate between carinae, with setae increasing in length toward apex of tibiae; all tibiae widened and lacking emargination apically. Tarsi densely and uniformly pilose beneath; basal tarsomere of fore- and middle legs triangular, with length subequal to width; second tarsomere broadly triangular, with acute apicolateral angles; third tarsomere longer than second, deeply bilobed; claws divergent, appendiculate. Elytra inflated, evenly punctate or striate, surface between punctures smooth with scattered small punctulae; humeri not prominent, broadly rounded; basal calli obsolete; postbasal depression lacking. Sides broadly rounded; apices conjointly rounded. Epipleuron narrow, slanted downward, visible in lateral view, tapering evenly from base to apex. Hind wing reduced to narrow strap or tiny lobe (Fig. 11–13). Scutellum with base subequal to length; surface smooth, with few punctulae. Abdomen with segments decreasing in length posteriorly, with scattered erect setae, surface of segments smooth. Sternum VII with lateral margins smooth. Pygidium (Fig. 9) with broad longitudinal median groove. Male Genitalia: Basal hood of median lobe constricted at point of attachment; median lobe in lateral view strongly curved (Fig. 14); apex of median lobe broad, subbasal fenestra present; basal spurs acute. Female Genitalia: Segments VIII–XI forming long telescoping ovipositor (Fig. 21, 24). Sternum VIII membranous with aciculate apodeme; dorsum of segment VIII with thin diagonal sclerites (Fig. 23). Segment IX with hemisternites aciculate; paraprocts separated into pair of slender dorsal rods, apically forming

hood-like projection above genital orifice; baculum apical, subequal to gonocoxae. Gonocoxae moderately elongate with setae apically and laterally. Spermatheca (Fig. 29, 31–32) with receptacle bulbous, duct straight or convoluted.

**Remarks.** *Apterodina* can be distinguished from all other Neotropical Eumolpinae by the following combination of characters: 1) humeri broadly rounded and lateral margins of elytra arcuate; 2) prosternum with a thick perpendicular anterior margin, with a low bead in front of coxae; 3) hind wings greatly reduced; 4) pygidial groove present. *Apterodina* most closely resembles *Brachypterodina* (described below) but can be distinguished by the raised front margin of the prosternum. *Dictyneis*, the other known apterous Neotropical eumolpine differs from both these genera in having the prosternum excavated, normally developed subquadrate humeri, and various patterns of tubercles on the elytra.



**FIGURES 1–2.** *Brachypterodina morae*. 1. male, dorsal view; 2. female, dorsal view.



FIGURES 3–6. *Apterodina* spp. 3–4, *Apterodina bechynei*: 3. male, dorsal view; 4. female, dorsal view. 5; *A. bucki* female, dorsal view; 6. *A. ruminyahui* female, dorsal view.

### Key to species of *Apterodina*

1. Punctures arranged in striae on basal half of elytra; lateral margin of pronotum weakly undulate; known from Ecuador ..... *ruminyahui* **n. sp.**
1. Punctures confused on basal half; lateral margin of pronotum evenly rounded ..... 2
2. Elytra tuberculate behind humeri; pronotum and elytra coarsely punctate .....  
..... *granulifera* Bechyné.
2. Elytra not tuberculate; pronotum more finely punctate than elytra ..... 3
3. Color bronzy black; known from southeast Brazil ..... *bucki* Bechyné
3. Color dark brown; known from Colombia ..... *bechynei* **n.sp.**

*Apterodina bechynei* Flowers, new species

(Figs. 3–4, 12, 14–16, 21–23, 29, 33)

**Holotype:** Male. Length 4.1 mm. Head, pronotum, elytra and underside dark brown with faint metallic sheen; antenna reddish brown, segments 7–9 paler. Legs dark reddish brown. Mouthparts reddish brown, mandibles piceous; with apex of labrum emarginate, with 2 dorsal setae and short row of lateral setae along outer margin. Mandibles with lateral surface smooth and setose. Prothorax distinctly wider than long,  $L/W = 0.59$ ; pronotum strongly convex, anterior angles acute, directed antero-laterally; lateral margins narrow, rounded, strongly converging in apical third, with widest part of pronotum anterior to middle; disc regularly, finely punctate, with punctures separated by a distance greater than their diameters. Prosternum with long setae, finely punctate, expanded laterally behind coxae; intercoxal process shallowly concave, its posterior margin weakly emarginate, lateral angles of intercoxal process thickened, width of intercoxal process  $0.56 \times$  diameter of procoxa. Mesosternum flat between coxae, surface smooth, with long yellow setae. Metasternum narrow between meso- and metacoxae, weakly alutaceous, with short yellow setae. Elytra inflated, punctate-striate in apical half, more or less evenly punctate in basal half, with punctures in striae separated by distance much less than the diameter of a puncture; surface between punctures smooth with scattered small punctulae; humeri not prominent, broadly rounded, width across humeri  $1.1 \times$  width across pronotum; basal calli obsolete; postbasal depression lacking; sides broadly rounded, convergent; apices conjointly rounded. Hind wing reduced to a narrow strap (Fig. 12). Scutellum V-shaped. Abdomen with numerous erect setae, surface of segments smooth. Sternum VII with lateral margins smooth, a weak depression in center. Pygidial surface smooth, lateral margins smooth, with long setae apically. Median lobe in lateral view smoothly curved (Fig. 14); apex pointed (Fig. 15); basal hood long, lightly sclerotized, with apodemes indistinct at lateral margins of hood; subbasal fenestra present; basal spurs prominent; tegmen triangular; apical sclerite small, hook shaped (Fig. 16).

**Allotype:** Female. Length 5.2 mm; color similar to male. Head with labrum, frons, clypeus, eyes and antennae similar to male; mouthparts similar to male. Prothorax distinctly wider than long,  $L/W = 0.57$ ; pronotum as in male; evenly punctate on disc; with punctures separated by distance equal to or slightly greater than their own diameters. Lateral arm of prosternum and proepimeron as in male; prosternum similar to male, but with width of intercoxal process  $1.17 \times$  diameter of procoxa, broadened behind coxae, posterior angles slightly swollen, posterior margin straight and weakly crenulate. Mesosternum, metasternum and metepisternum as in male. Legs similar in form to male, and basal tarsomere of fore- and middle legs not expanded. Elytra with punctation and apical intervals similar to male, but with short striae along basal margin of elytra; punctures behind humerus deep and rugose, a weak depression behind humerus. Scutellum V-shaped. Abdomen with segments VIII–XI forming elongate ovipositor (Fig. 21). Sternum VIII with long strap-like basal apodeme; only several setae remain of the apicolateral arms;

dorsum of segment VIII with diagonal dorsal sclerites (Fig. 23). Hemisternites with long, thin basal rods, weakly sclerotized apically; paraprocts separated into pair of slender dorsal rods, apically forming hood-like projection above genital orifice (Fig. 22); baculum indistinct, apical, longer than gonocoxae. Gonocoxae short, robust, with long setae at apices; coxostyli very small, with several long apical setae. Spermatheca (Fig. 29) with duct and gland openings adjacent on swollen receptacle; spermathecal duct short, sclerotized, not coiled.

**Etymology.** This species is named for Jan Bechyné, who described the genus and played a key role in the systematics of Neotropical Chrysomelidae.

**Specimens Examined.** (4 ♂♂ and 5 ♀♀) (NHMB): Male HOLOTYPE labeled COLOMBIA, Cundinamarca, Monterredondo, 1400m., 23-X-1961, leg. Schneble. Female ALLOTYPE (NHMB): same data as holotype. PARATYPES: 1 ♂, 2 ♀♀ (NHMB), same data as holotype; 2 ♂♂, 2 ♀♀ (1 ♂, 1 ♀ NHMB; 1 ♂, 1 ♀ HUM), same locality and collector as holotype, 22-VII-1961.

***Apterodina bucki* Bechyné**

(Figs. 5, 9, 13, 31, 33)

*Apterodina bucki* Bechyné 1954:117.

**Female.** Length 3.8–4.2 mm. Head, pronotum, elytra and underside brownish black with faint metallic sheen; antenna reddish brown, segments 7–9 paler. Legs piceous reddish brown. Mouthparts and mandibles piceous; labrum with 2 dorsal setae and short row of lateral setae along outer margin. Mandibles with lateral surface smooth, a prominent seta on dorsal surface at angle. Prothorax distinctly wider than long,  $L/W = 0.62$ ; pronotum strongly convex, anterior angles quadrate, rounded, posterior angles obtuse; lateral margins narrow, rounded, strongly converging in apical third, with widest part of pronotum near middle; disc regularly, punctate, with punctures separated by a distance subequal to their own diameters. Undersurface of thorax smooth. Prosternum with intercoxal process flat, its width 1.0 x diameter of procoxa. Mesosternum with scattered setae. Metasternum very short, narrow between meso- and metacoxae, transversely wrinkled, with short yellow setae. Elytra inflated, more or less evenly punctate, with punctures separated by distance greater than the diameter of a puncture; surface between punctures smooth with scattered small punctulae; humeri not prominent, broadly rounded, width across humeri 1.05 x width across pronotum; basal calli obsolete; postbasal depression lacking; sides broadly rounded, convergent; apices mucronate at sutural angle. Hind wing reduced to narrow strap (Fig. 13). Scutellum U-shaped. Abdomen with scattered erect setae, surface of segments smooth. Pygidium densely setose on posterior margin (Fig. 9). Segments VIII–XI forming elongate ovipositor. Sternum VIII with long aciculate basal apodeme. Spermatheca (Fig. 31) with pump and receptacle not differentiated, a thin apodeme on the apex of pump; spermathecal duct thin and coiled.

**Male.** unknown.

**Specimens Examined.** 1 ♀ (NHMB): Porto Alegre; P-type, *Apterodina bucki* m., J. Bechyn det. 1953. 1 ♀ (NHMB): Parecy Novo no other data. The type (not seen) is in the Pio Buck collection (Bechyné 1954), currently in the Colegio Anchieta in Sao Paulo (C. Duckett, pers. com.).

***Apterodina granulifera* Bechyné**

(Fig. 33)

*Apterodina granulifera* Bechyné, 1964:120

This species, known from a single female in the Senckenberg Museum, was not examined for this study. The characters in the key are taken from a short determination table Bechyné provided to distinguish this species from *A. bucki*. This species is geographically disjunct from *A. bucki*, being found only in southeastern Brazil (Alto da Serra and Rio Grande do Sul).

***Apterodina ruminyahui* Flowers, new species**

(Fig. 6, 11, 24, 32, 33)

**Holotype:** Female. Body oval; length 4.1 mm. Head, pronotum, elytra, and underside black; antenna with scape and pedicle reddish brown, segments 3–11 piceous. Underside piceous with femora, tibiae, and tarsae reddish brown. Mouthparts reddish brown, mandibles piceous. Prothorax wider than long,  $L/W = 0.6$ , pronotum with anterior angles rounded, posterior angles obtuse, lateral margins narrow, weakly undulate, greatest width of pronotum anterior to middle; disc regularly, densely punctate, with punctures separated by distances less than their diameters. Prosternum with a thick perpendicular anterior margin; intercoxal process strongly raised anteriorly, posterior margin of intercoxal process truncate, width of intercoxal process  $0.83 \times$  diameter of procoxa. Lateral arms of prosternum with a raised bead along the anterior margin. Metasternum very narrow between meso- and metacoxae, with scattered yellow setae. Elytra with punctures arranged in irregular striae, punctures in striae separated by distances less than their diameters; humeri not prominent, width across humeri  $1.16 \times$  width across pronotum. Hind wing reduced to tiny lobe (Fig. 11). Scutellum V-shaped. Abdomen with sternum VII with lateral margins smooth, pygidium with long fine setae in apical half. Abdominal segments VIII–XI forming long ovipositor (Fig. 24). Baculum distinct, apical, subequal to gonocoxae. Gonocoxae moderately elongate, with long setae in apical half. Spermatheca (Fig. 32) with receptacle bulbous, pump elongate, coiled; spermathecal duct fine, membranous.

**Male.** Unknown.



**Etymology.** This species is named for Rumiñahui, the Inca general who organized resistance against the Spanish in the Quito area after the fall of Atahualpa.

**Specimens Examined.** (1♀) Female HOLOTYPE (NMNH) labeled ECUADOR: Pichincha, 32 km. S. Quito (paramo) 30 April 1978, CW&LB OBrien & Marshall.



**FIGURES 7-9.** 7-8, *Brachypterodina gonzalezi*. 7. female, dorsal view; 8. humeral area enlarged; 9. *Apterodina bucki*, pygidium.

***Brachypterodina* new genus (Fig. 12, 7-8, 10, 17-20, 25-28, 30, 34)**

**Type species.** *Brachypterodina morae* n. sp., here designated.

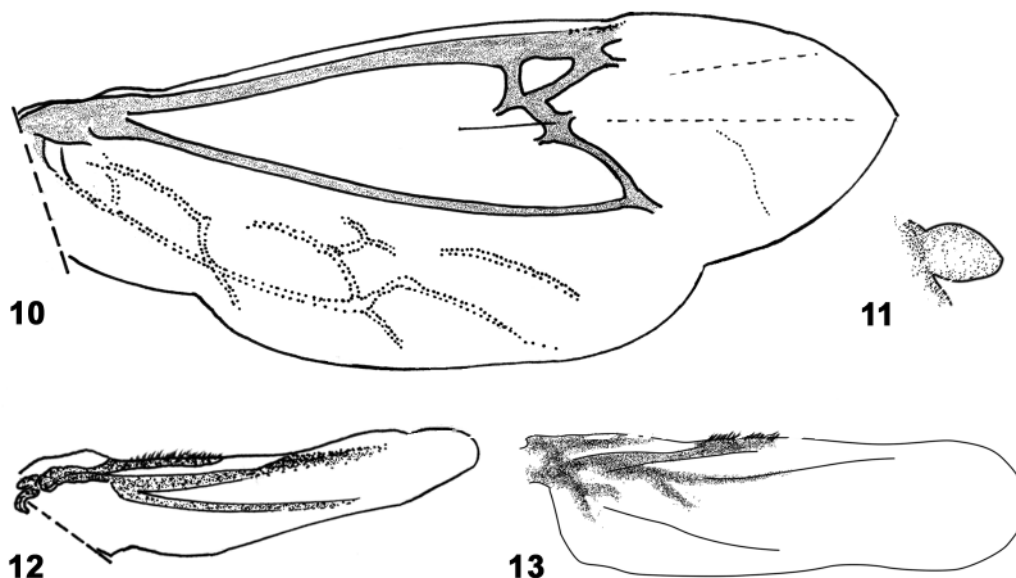
Body ovate, dorsally convex. Head with clypeus coarsely punctate, punctures separated by distance greater than diameter of a puncture. Frons coarsely punctate, punctures separated by distance greater than diameter of a puncture; surface between punctures microreticulate, vertex coarsely punctate; antennal calli flat. Eyes oval, shallowly and broadly emarginate at antennal insertion. Antenna with scape elongate oval, pedicel subglobose, shorter than scape, distinctly shorter than flagellomere 1; flagellum subclavate, antennomeres robust, each slightly wider at apex; antennomeres 36 with scattered appressed setae, antennomeres 7-11 densely pubescent, with whorl of long erect setae at apex of antennomeres 3-10; antennomere 11 spindle-shaped. Mouthparts with apex of labrum emarginate, with 2 dorsal setae and a pair of long lateral setae at outer angles. Mandibles with outer margin with sharp bend, lateral surface microreticulate and setose, two prominent setae on dorsal surface, apical teeth broad, pointed. Maxillary palpi with apical segment tapered. Prothorax distinctly wider than long, pronotum convex, with posterior margin wider than anterior margin; anterior angles acute, directed laterally, posterior angles obtuse; all angles with a seta-bearing puncture; basal marginal bead present; lateral margin narrow, rounded, greatest width of pronotum anterior to middle; disc regularly, finely punctate, with punctures separated by a distance greater than their own diameters; surface between punctures shining. Prosternum with anterior margin closely fitting against cervix; with long setae, finely punctate, intercoxal process expanded laterally

behind coxae, with posterior margin truncate. Lateral arms of prosternum with anterior margin straight, surface glabrous. Proepimeron weakly concave, sparsely punctate, with punctures separated by distance greater than diameter of a puncture, with surface alutaceous. Mesosternum subequal in width to prosternum, flat between coxae, surface punctate, with long yellow setae. Metasternum narrow between meso- and metacoxae, smooth, with numerous short yellow setae; metepisternum broad, gradually narrowed posteriorly, with surface alutaceous. Legs sparsely covered with short prostrate setae; all surfaces alutaceous. Femora strongly swollen in middle. Tibiae multicarinate, slightly to moderately sulcate between carinae, with setae increasing in length toward apex of tibiae; all tibiae widened apically, lacking apical emargination. Tarsi densely and uniformly pilose beneath; basal tarsomere of fore- and middle legs triangular, with length subequal to width; second tarsomere broadly triangular, with acute apicolateral angles; third tarsomere longer than second, deeply bilobed; terminal tarsomere distinctly surpassing apex of third tarsomere; claws divergent, appendiculate. Elytra with humeri not prominent, broadly rounded, sides broadly rounded, convergent; apices conjointly rounded. Epipleuron slanted downward, visible in lateral view, tapering evenly from base to apex. Hind wing reduced (Fig. 10) or lacking. Scutellum V-shaped, with base subequal to length; surface smooth, with few punctulae. Abdomen with segments subequal in length, with numerous erect setae. Sternum VII with lateral margins smooth. Pygidium with longitudinal median groove broad, shallow, extending almost to apical margin, low median carina present on floor of median groove; pygidial surface smooth, lateral margins smooth, with long setae apically. Male Genitalia: Median lobe in lateral view curved (Fig. 17); basal hood long, lightly sclerotized, with apodemes distinct at lateral margins of hood; subbasal fenestra present; basal spurs small, acute; tegmen triangular. Female Genitalia: Segments VIII–XI forming elongate ovipositor (Fig. 25). Sternum VIII with long aciculate basal apodeme; only several setae remain of the apicolateral arms; dorsum of segment VIII with two pairs of weak sclerites laterally (Fig. 27). Segment IX with hemisternites with long aciculate basal rods, paraprocts separated into pair of slender dorsal rods, apically forming hood-like projection above genital orifice (Fig. 26); baculum aciculate, apical. Gonocoxae narrow, with long setae in apical half; coxostyli very small, with several long apical setae. Spermatheca (Fig. 28, 30) with receptacle bulbous, continuous with pump, spermathecal duct sclerotized and inflated.

**Etymology.** *Brachy*, from Greek meaning short; *ptero*, from Greek meaning wing.

**Remarks.** *Brachypterodina* can be distinguished from all other Neotropical Eumolpinae by the following combination of characters: 1) humeri broadly rounded and lateral margins of elytra arcuate; 2) anterior margin of prosternum closely applied to cervix; 3) hind wings either reduced or absent; 4) pygidial groove present; 5) spermathecal duct sclerotized, tightly coiled and inflated. *Brachypterodina* most closely resembles *Apterodina* but the shape of the spermatheca and spermathecal duct are very different from known *Apterodina*, as well as other known Neotropical Eumolpinae. *Brachypterodina* will key to

either *Brachypnoea* Gistel or *Alethaxius* Lefèvre in Flowers (1996), depending on how clavate the antenna appears to the observer, but can be distinguished by the broadly rounded humeri.



**FIGURES 10-13.** Hind wings. 10. *Brachypterodina morae*; 11. *Apterodina ruminyahui*. 12; *Apterodina bechynei*; 13. *Apterodina bucki*.

#### Key to species of *Brachypterodina*

1. Elytra strongly geminate striate, shining black; female elytra strongly tuberculate in humeral area ..... *gonzalezi* **n. sp.**
1. Elytra weakly geminate striate, matt with dull purple reflection; female with only a few tubercles in humeral area of elytra ..... *morae* **n. sp.**

#### *Brachypterodina gonzalezi* Flowers, new species

(Fig. 7-8, 28, 34)

**Holotype:** Female. Length 3.6 mm. Head, pronotum, elytra and underside bronze-black; antenna reddish brown, darker apically. Legs reddish brown, sides of femora dark brown. Head with clypeus coarsely punctate, surface between punctures shining, weakly microreticulate, apex of clypeus truncate. Frons coarsely, rugosely punctate, surface between punctures microreticulate. Mouthparts reddish brown; with apex of labrum emarginate, with 2 dorsal setae and long lateral setae at outer angles. Prothorax distinctly wider than long, L/W = 0.68. Pronotum with anterior angles subquadrate, posterior angles acute; all

angles with a seta-bearing puncture; greatest width of pronotum at middle; disc regularly, strongly punctate, with punctures separated by a distance slightly greater than their own diameters; surface between punctures shining, with numerous punctulae. Prosternum microreticulate, declivous and expanded laterally behind coxae, width of intercoxal process 0.87 x diameter of procoxa. Lateral arms of prosternum with anterior margin straight, a weakly reflexed margin anterior to the procoxae. Elytra striate, with punctures in striae separated by distance less than the diameter of a puncture; surface of elytral intervals finely microreticulate; basal half of elytra with elongate, high tubercles on intervals 2–8 (Fig. 8), interval 6 subangulate, intervals 7–8 weakly costate; humeri not prominent, broadly rounded, width across humeri 0.97 x width across pronotum; basal calli obsolete; post-basal depression lacking; sides broadly rounded, convergent; apices weakly produced. Hind wings absent. Abdomen with surface of segments alutaceous. Female genitalia: Segments VIII–XI forming elongate ovipositor similar to Fig. 25. Spermatheca (Fig. 28) with pump and receptacle not differentiated, spermathecal duct and gland approximate on the apex of the receptacle; spermathecal duct moderately long, sclerotized, thin in proximal third, abruptly widened, convoluted and more strongly sclerotized in distal two thirds.

**Male.** Unknown

**Etymology.** This species is named for its collector, Roger Gonzalez Tenorio, a parataxonomist with INBio.

**Specimens examined.** (1♀) Female HOLOTYPE (INBio) labeled COSTA RICA Prov. Limn P. Int. la Amistad, Refug. Valle Silencio 2400m, 16-19 Apr. 2001. R. Gonzalez, Trampa de Foso, L\_S\_341400\_577250#62779 (INB0003316203).

***Brachypterodina morae* Flowers, new species**

(Figs. 1–2, 10, 17–20, 25–28, 30, 34)

*Apterodina* sp. 1, Flowers and Hanson 2003:41

**Holotype:** Male. Length 4.7 mm. Head, pronotum, elytra and underside purplish bronze-black; antenna reddish brown, darker apically. Legs reddish brown, tarsi and undersides of femora dark brown. Head with clypeus coarsely punctate, surface between punctures microreticulate, apex of clypeus emarginate. Frons coarsely punctate; vertex coarsely punctate, surface between punctures smooth; antennal calli microreticulate. Mouthparts reddish brown, mandibles piceous; with apex of labrum emarginate, with 2 dorsal setae and a pair of long lateral setae at outer angles. Prothorax distinctly wider than long, L/W = 0.61; pronotum convex, lateral margins narrow, rounded, greatest width of pronotum anterior to middle; disc regularly, finely punctate, with punctures separated by a distance greater than their own diameters; surface between punctures shining, weakly microreticulate medially, more strongly microreticulate near antero-lateral angles. Prosternum expanded laterally behind coxae; posterior margin of intercoxal process truncate, width of

intercoxal process 0.57 x diameter of procoxa. Legs with basal tarsomere of fore and middle legs expanded as in Fig. 1. Elytra with punctures in irregular geminate striae, with punctures separated by distance less than or equal to the diameter of a puncture; surface between punctures weakly microreticulate, more strongly so at apical angle; humeri not prominent, broadly rounded, width across humeri 1.13 x width across pronotum; basal calli obsolete; postbasal depression lacking. Sides broadly rounded, convergent; apices conjointly rounded. Hind wing (Fig. 10) reduced, not folding at rest under the elytra. Abdomen with numerous erect setae, surface of segments granulate. Sternum VII with a weak depression in center. Median lobe in lateral view smoothly curved (Fig. 17); apex bluntly rounded (Fig. 18); basal hood lightly sclerotized with apodemes distinct at lateral margins of hood; subbasal fenestra present; basal spurs small; tegmen triangular; apical sclerite convoluted (Fig. 19). Endophallus (partially everted, Fig. 17) with basal and endophallic lateral digits prominent, weakly sclerotized (Fig. 20), sclerotized basal supporting block lacking, basal setae present.

**Allotype:** Female. Length 5.6 mm; head, pronotum, elytra and underside piceous with a strong bronze to purple-bronze reflex; antennae and legs reddish brown. Head with labrum, frons, clypeus, eyes, antennae, and mouthparts similar to male. Prothorax distinctly wider than long,  $L/W = 0.62$ ; shape of pronotum as in male; evenly punctate on disc; with punctures separated by distance equal to or less than their own diameters, punctures aciculate and more closely spaced laterally. Proepisternum and proepimeron as in male; prosternum similar to male, but with width of intercoxal process 0.63 x diameter of procoxa, broadened behind coxae, posterior angles slightly swollen, posterior margin straight and weakly crenulate. Mesosternum, metasternum and metepisternum as in male. Legs similar in form to male, but basal tarsomere of fore- and middle legs not expanded. Elytra with punctures in broad geminate striae, punctures fine on disc, deeper near lateral margins; humerus sharply raised, a deep depression behind humerus, two short, weak costae behind and lateral to posthumeral depression. Elytra weakly angulate above lateral margin; epipleuron as in male. Abdomen with segments as in male; pygidium as in male. Segments VIII–XI forming elongate ovipositor (Fig. 25). Sternum VIII with long strap-like basal apodeme; only several setae remain of the apicolateral arms; dorsum of segment VIII with two pairs of linear sclerites (Fig. 27). Segment IX with hemisternites with long aciculate basal rods; paraprocts separated into pair of slender dorsal rods, apically forming hood-like projection above genital orifice (Fig. 28); baculum distinct, apical, longer than gonocoxae. Gonocoxae slender with long setae in apical half; coxostyli very small, with several apical setae. Spermatheca (Fig. 30) with spermathecal duct inflated, sclerotized, coiled.

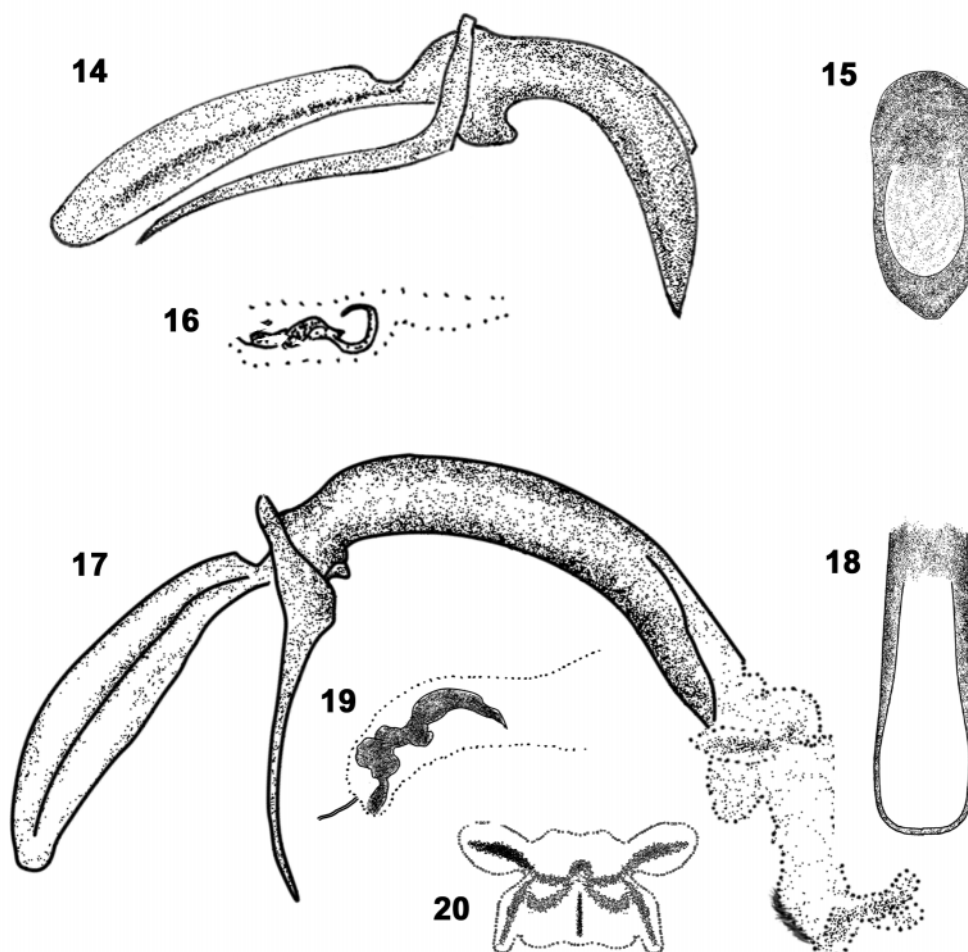
**Etymology.** This species is named for INBio parataxonomist Angela Mora Maroto, who collected a number of specimens in the type series.

**Specimens examined.** (33♂♂, 53♀♀) Male HOLOTYPE (INBio) labeled COSTA RICA Est. Cuerici (Alrededor) 4.6 Km al E. de Villa Mills, 2600m 22-Nov-10 DEC 1995.

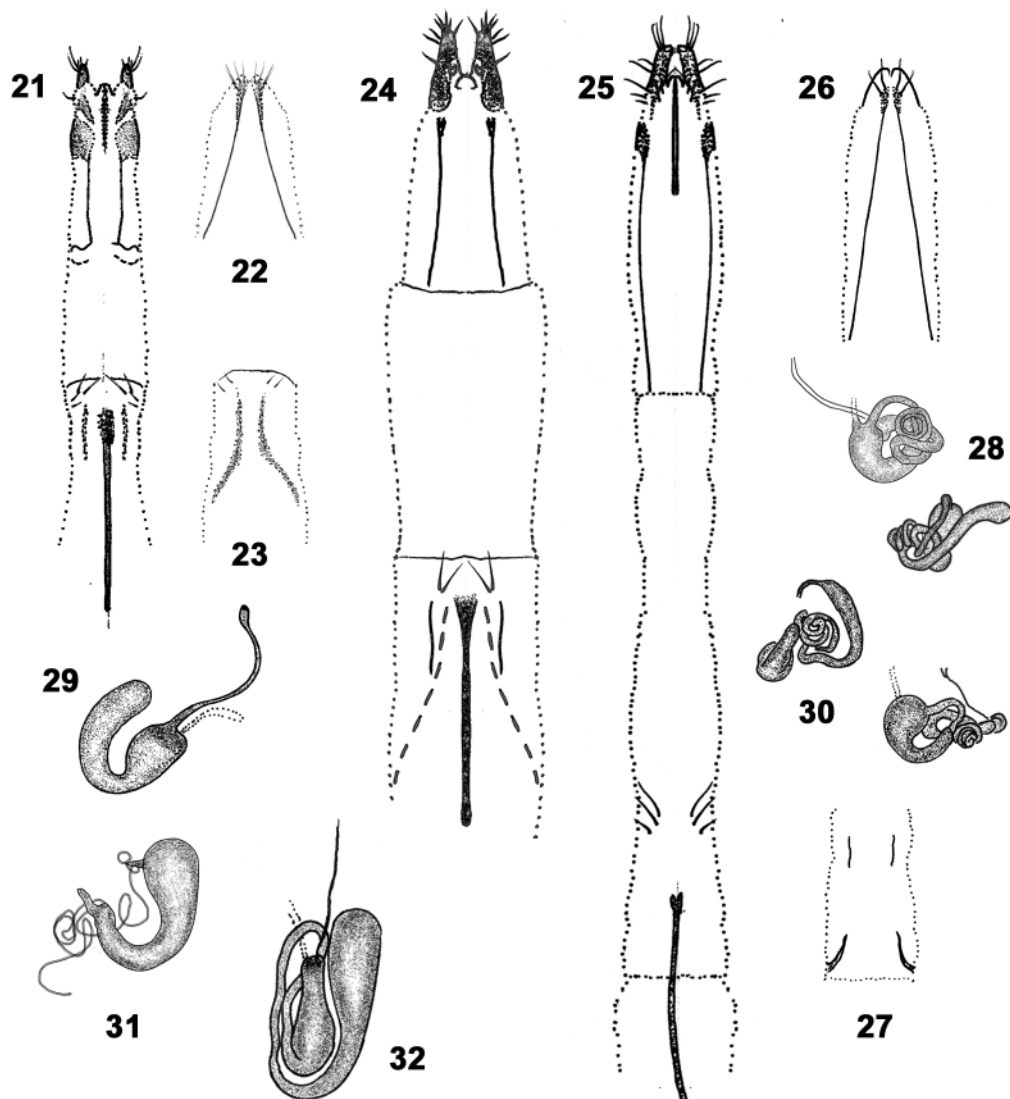
A.M. Maroto, Red de Golpe, L\_S\_389400-499600 #6466 (INBIOCRI002378489). Female ALLOTYPE (INBio) labeled COSTA RICA, Est. Cuerici (Alrededor) 4.6 Km al E. de Villa Mills, 2600m 22-25-Nov-1995,. A.M. Maroto, de luz, L\_S\_389400-499600 #6458 (INBIOCRI002367639). PARATYPES (32 ♂♂, 52 ♀♀): COSTA RICA, Heredia Province: 1 ♀ (INBIOCRI001007575), Est. Barva, Braulio Carrillo N.P., 2500m. April 1989. M. Zumbado & A. Fernandez. San Jos Province: 28 ♂♂, 48 ♀♀ (18 ♂♂, 38 ♀♀ MZUCR; 10 ♂♂, 10 ♀♀ INBio; 5 ♂♂, 5 ♀♀ NMNH) (in alcohol). Cerro de la Muerte, 19 km S and 3km W. Empalme 2800m. XII-1992, P. Hanson; 1 ♂ (INBIOCRI002378588), 1 ♀ (INBIOCRI002378582), Est. Cuerici (Alrededor) 4.6 Km al E. de Villa Mills, 2600m 22-Nov-10 DEC 1995. A.M. Maroto, sombrereta L\_S\_389400-499600 #6466 #6467; 1 ♂ (INBIOCRI002371847), Est. Cuerici Send. El Carbon, 5 Km al E. de Villa Mills, Prov. 2600m 31-MAR-1996. B. Gamboa, L\_S\_389550-500050#7046; 1 ♀ (INBIOCRI002362499) same locality, A. Picado, sombrereta, #6431; 1 ♀ (INBIOCRI002380194), same locality, B. Gamboa, sombrereta, #7038; 1 ♂ (INBIOCRI002392473), Est. Cuerici Send. El Mirador. Alrededor de la Est. 4.6 Km al E. de Villa Mills, Prov. 2600m 11-ENE-1996. B. Gamboa, Sombrereta, L\_S\_ 389400-499600.

**Discussion.** Although *Apterodina* and *Brachypterodina* are morphologically distinct among known Neotropical Eumolpinae, their distinguishing characters are all reductions based on atrophy of the hind wings, an event that undoubtedly has happened repeatedly among beetle populations at high altitudes. *Apterodina* itself may include more than one lineage, given the highly disjunct distribution of its species. At this point, it is impossible to say how they relate to the lowland fauna, due to the fact that detailed studies of the many lowland genera have scarcely begun. Bechyné (1954) stated that *Apterodina* was close to *Microaletes* Lefèvre, without giving any explanation. Other possible sister groups are *Brachypnoea* and some of the small *Rhabdopterus* Lefèvre species.

*Brachypterodina morae* has been found abundant only one time, in a single Malaise trap collection from Cerro del la Muerte, Costa Rica (Flowers and Hansen 2003, listed as *Apterodina* sp. 1). The trap was in a pasture at the edge of cloud forest. The other species of *Apterodina* and *Brachypterodina* are known only from one or a few specimens without biological data. In a review of alpine adapted Chrysomelidae, Jolivet (1997) cited numerous examples of brachyptery in the subfamilies Chrysomelinae and Galerucinae but stated that Eumolpinae have not colonized high altitudes with attendant wing reduction to the same extent. While Eumolpinae apparently have not colonized high altitudes to the extent of these other subfamilies, at least a few species have lost the power of flight while getting high in the mountains of the Neotropics.

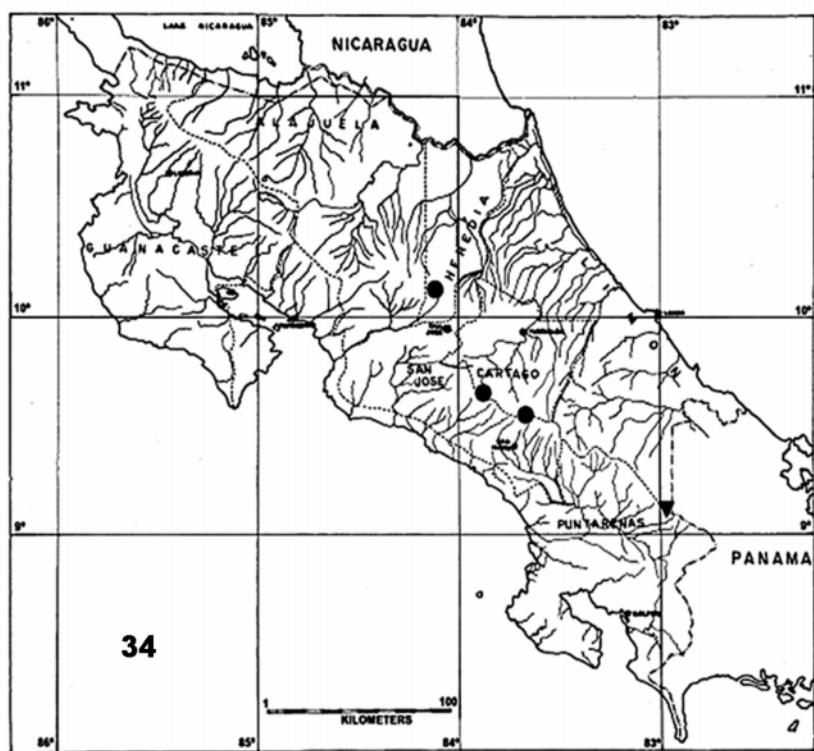
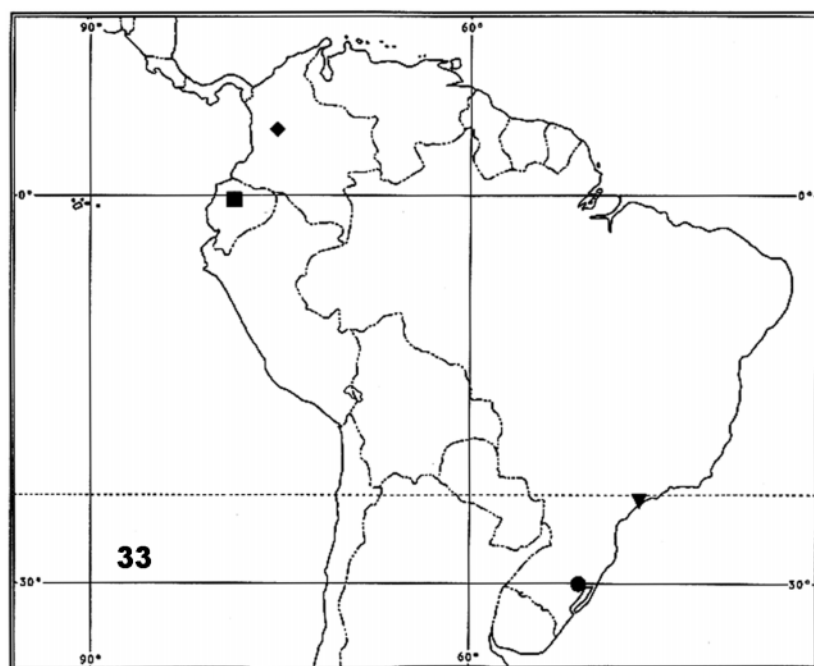


**FIGURES 14-20.** Male genitalia. Figs. 14-16, *Apterodina bechynei*; 14. median lobe, lateral view; 15. median lobe, apex; 16. apical sclerite. Figs. 17-20, *Brachypterodina morae*; 17. median lobe and base of endophallus, lateral view; 18. median lobe, apex; 19. apical sclerite; 20. endophallic lateral digits of endophallus.



**FIGURES 21-32.** Female genitalia. Figs. 21-23, 29. *Apterodina bechynei*; 21, ovipositor, ventral view; 22, dorsal hood of segment IX. 23, segment VIII, dorsal view; 29, spermatheca. Figs. 24, 32, *Apterodina ruminyahui*; 24, ovipositor, ventral view; 32, spermatheca. Figs. 25-27. 30, *Brachypterodina morae*; 25, ovipositor, ventral view; 26, dorsal hood of segment IX. 27, segment VIII, dorsal view; 30 (above and right), spermatheca; 28 (left and below), *Brachypterodina gonzalezi*, spermatheca. 31, *Apterodina bucki*, spermatheca.





**FIGURES 33-34.** Distribution of *Apterodina* and *Brachypterodina*. 33. Distribution of *Apterodina*; *A. bechynei*, closed diamond; *A. bucki*, closed circle; *A. granulifera*, closed triangle; *A. ruminyahui*, closed square. 34. Distribution of *Brachypterodina*. *B. gonzalezi*, closed triangle; *B. morae*, closed circle.

## Acknowledgements

This research was funded in part by the Costa Rica National Biodiversity Inventory and the Biodiversity Resources Development Project, GEF/World Bank, and in part by a grant (FLAX 91005) from CSREES, USDA to Florida A&M University.

## Literature cited

- Askeveld, I.S., & Flowers, R.W. (1994) *Glyptosceloides dentatus*, a genus and species of Eumolpinae new to Chile (Coleoptera: Chrysomelidae). *Revista Chilena de Entomologia*, 21, 69–76.
- Bechyné, J. (1954) La liste des eumolpides de Rio Grande do Sul (Brésil) et observations diverses sur les espèces néotropicales. *Arquivos do Museu Paranaense*, 10, 143–240.
- Bechyné, J. (1964) Notes sur quelques Chrysomeloidea néotropicaux (Col. Phytophaga). *Revista Brasileira de Entomologia*, 11, 117–137.
- Flowers, R.W. (1995) *Hermesia* Lefvre, a resurrected genus of Neotropical Eumolpinae (Coleoptera: Chrysomelidae). *Proceedings of the Entomological Society of Washington*, 97, 35–45.
- Flowers, R.W. (1996) La Subfamilia Eumolpinae (Coleoptera: Chrysomelidae) en América Central. *Publicacin especial No. 2 de la Revista de Biología Tropical*, 59 pp.
- Flowers, R.W. (1999) Internal structure and phylogenetic importance of male genitalia in the Eumolpinae. in Cox, M.L. (ed.) *Advances in Chrysomelidae Biology 1*, Backhuys Publishers, Leiden, pp. 71–93.
- Flowers, R.W. & Hanson, P.E. (2003) Leaf beetle (Coleoptera: Chrysomelidae) diversity in eight Costa Rican habitats. In Furth, D.G. (Ed.) *Special Topics in Leaf beetle Biology*, Proceedings of the 5<sup>th</sup> International Symposium on the Chrysomelidae. Pensoft, Sofia, pp. 25–51.
- Furth, D.G. (1980) Wing polymorphism, host plant ecology, and biogeography of *Longitarsus* in Israel (Coleoptera: Chrysomelidae). *Israel Journal of Entomology*, 13, 124–148.
- Jerez, V. (1996) Biology and phylogenetic remarks of the sub-antarctic genera *Hornius*, *Stenomela* and *Dictyneis* (Chrysomelidae: Eumolpinae). In Jolivet, P.H.A. & Cox, M.L. (Ed.) *Chrysomelidae Biology, Volume 3: General Studies*, SPB Academic Publishing bv, Amsterdam, pp. 239–258.
- Jolivet, P. (1997) *Biologie des Coléoptères Chrysomelides*, Société Nouvelle des Éditions Boubée. Paris, 279 pp.
- Konstantinov, A.S. (2002) A new genus of flea beetles from the Greater Antilles (Coleoptera: Chrysomelidae), *Zootaxa*, 124, 1–24.